will be used along the faces of the two sections of the shutter to make it as nearly as possible airtight.

The design of the telescope mounting has advanced rapidly, and at present most of the general drawings are essentially complete. Detailed drawings of the north and south pedestals and the mercury tanks and floats have been sent to the Fore River Shipbuilding Corporation of Quincy, Massachusetts, which will build the more massive parts of the mounting. Castings have already been made for the two pedestals and one of the two mercury tanks. The most difficult part of the instrument from the point of view of design is probably the large polar axis and fork within which is swung the tube of the telescope. This is built up of structural steel and will be rectangular in shape, about 32 feet long and 16 feet wide. The fork will be made in four sections and will be bolted together in place on Mount Wilson. These sections will be among the heaviest parts of the telescope mounting, as each section will weigh about seven tons. The large declination bearings will be built into the side members of the fork, the steel castings forming the cases for the bearings, being riveted to the structural steel of the fork.

Work has been progressing steadily on the 100-inch mirror and recent tests have shown a figure which is very nearly spherical and with but a small amount of astigmatism. Zonal errors have been reduced greatly, and the parabolizing of the surface will be begun in a few weeks, it is hoped. A considerable amount of work has been done on the 60-inch plane mirror, which will be used in testing the 100-inch mirror during the work of parabolizing. With the edge support now in use, no evidence is found of differences of flexure along different diameters of the mirror. W. S. ADAMS.

MOUNT WILSON SOLAR OBSERVATORY.

STELLAR SPECTROSCOPIC NOTES.

Observations of the Companion of Rigel.—Four photographs, with low dispersion of the spectrum of the seventh-magnitude companion of *β Orionis* indicate that its spectrum is identical with that of the principal star. The difference in brightness, as determined by the Harvard observers, is 6.5 magnitudes, and the identity of the spectra of two stars, which almost cer-

tainly form a physical system and which differ so greatly in absolute luminosity, is rather a remarkable fact.

The mean radial velocity given by the four plates is $+ 20^{km}$, a value in close agreement with the value of $+ 22^{km}$ found for the center of mass of the spectroscopic binary system to which the principal star belongs. The four plates show a moderate range, but the fact that the star is a very close visual binary makes the interpretation of the variation as a real change in velocity rather doubtful. The agreement of the radial velocities of the bright star and its companion make their physical connection very probable.

Some Radial Velocity Results.—Two spectrograms of the well-known parallax star Groombridge 34 ($\alpha = 0^h\ 13^m$), magnitude 8.2, show that the real motion of this star is almost wholly at right angles to the line of sight. The radial velocity given by the two plates is $- 1^{km}$. The spectra type of this star is Ma.

Three spectrograms of the star Lalande 15290 ($\alpha = 7^h\ 48^m$), magnitude 8.2, gives the following values of the radial velocity:

$$\begin{array}{c} -247^{km} \\ 241 \\ 239 \\ \hline \text{Mean } -242^{km} \end{array}$$

This is the largest radial velocity of any star so far observed by us. The motion in space, assuming the values for proper-motion and parallax collected by KAPTEYN, is 316^{km}. The spectrum of the star is Go.

In the *Astrophysical Journal* for April, 1912, the approximate radial velocities were published for two stars of high velocity. These were Lalande 5761 ($\alpha = 3^h\ 3^m$), magnitude 8.0, and Lalande 28607 ($\alpha = 15^h\ 38^m$), magnitude 7.3. The stars were classified as F and A respectively. Recently we have obtained a photograph with the Cassegrain spectrograph of Lalande 5761, which is of much better quality, and which shows that this spectrum must also be classified as A and is, in fact, almost identical with that of Lalande 28607. In both cases, however, the spectrum is peculiar in that λ 4481 is either absent or extremely faint, while the great strength of the

hydrogen lines and the presence of the principal arc lines of iron as faint absorption lines point to a normal classification of about A5. It is a singular coincidence that two stars, both of peculiar but very similar spectra, should be characterized by such large velocities. The single spectrogram of Lalande 5761 gives a value of -144^{km}, while four spectrograms of Lalande 28607 give -170^{km}.

The Spectra of Some Individual Stars in the Hercules Cluster.—Two photographs were recently obtained by Mr. PEASE of the spectrum of the *Hercules* cluster (Messier 13), using a small slit spectrograph at the primary focus of the 60-inch reflector. The exposures were 21 and 22 hours respectively, and the slit width was twice as great for the second exposure as for the first. The spectrograph is mounted in the opening of the double slide plate-holder regularly used for direct photography, so that very accurate guiding is possible. As a result the spectra of individual stars appear on the photographs. Of these it has been possible to classify six upon the first photograph and thirteen upon the second, or a total of nineteen separate stars, since the slit was set at two different positions for the two exposures. Using as a unit five divisions of the Harvard scale, the stars are classified as follows:—

A_0	2
A_5	5
F_0	2
F_5	8
G_0	2

Perhaps the two most important features of these results are: First, the absence of any stars of very late types of spectrum; second, the fairly regular succession of the spectra, agreeing with what is generally considered the order of stellar development. It is also clear that conclusions as to the spectral types of the stars in clusters must be based upon photographs showing the individual stars. W. S. ADAMS.

MOUNT WILSON SOLAR OBSERVATORY.

NOTE ON THE GEGENSCHEIN.

Doubtless many, whether amateurs or professional astronomers, have never seen this very difficult object, and a word or two as to its history and appearance may not be out of place.